REMARKS

Applicants have amended Claim 1 to add recitations which are contained in a combination of dependent claims (originally filed Claims 34 - 36), so that Claim 1 more specifically recites the subject matter of the invention as it is described in the application specification. This more specific recitation does not introduce any new matter into what was originally claimed, but makes clear the distinction over the art cited in rejecting the claims.

Claim Rejections Under 35 U.S.C. § 102:

Claims 30 - 38 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,927,178 to Kim et al.

In the previous Office Action mailed January 24, 2006, the Examiner rejected Claims 30 - 38 under the Kim et al. reference. In response, applicants argued that the Kim et al. reference issued on August 9, 2005 from an application which was filed on December 10, 2003 and published on October 28, 2004, and that the Kim reference did not meet the requirements under 35 U.S.C. § 102 (e)(1) or under 35 U.S.C. § 102 (e)(2), and that for this reason, the Kim et al. reference was not properly cited prior art.

Applicants did not make a full set of arguments with respect to why the disclosure in the Kim et al. reference did not anticipate the presently claimed invention, because applicants contended that the Kim et al. reference did not meet the requirements for citation in rejecting the presently pending claims.

The Examiner has responded by arguing that the Kim et al. reference is properly cited prior art because it claims priority based on a provisional application filed December 13, 2002. Applicants contend that the Examiner is not correct about this priority claim. While U.S. Patent No. 6,927,178 to Kim et al. recites in Col. 1, lines 4 and 5 that priority is claimed under U.S. Provisional Application No. 60/433, 355, filed December 13, 2002,

the Combined Declaration and Power of Attorney by the Inventors which was filed in the Kim et al. application makes only one priority claim under 35 U.S.C. § 120, and that is to U.S. Application Serial No. 10/193,489. There is no claim to priority under 35 U.S.C. § 120 with respect to Provisional Application No. 60/433,355.

Under these circumstances, since the priority claim in the Declaration executed by the inventors does not claim priority under Provisional Application No. 60/433,355, the filing date of the provisional application cannot be used to predate the priority date of the presently pending application. Even if the priority under the Provisional Application No. 60/433,355 had been proper, this application was never published, and so the differences in content of the provisional application from the Kim et al. reference which is being cited cannot be determined.

However, applicants were incorrect in their original analysis in arguing that all of the subject matter in the Kim et al. reference could not be cited against the present application. The Kim et al. reference did claim priority under 35 U.S.C. § 120 with respect to U.S. Patent Application, Serial No. 10/193,489, which was filed on July 11, 2002. However, the 10/193,489 application may be cited as having priority over the present application only for the subject matter it contained, and not for all of the subject matter in the Kim et al. reference, which is a CIP of the 10/193,489 application.

A comparison of the application specification for the 10/193,489 application with the application specification for the Kim et al. reference shows that the following text which is present in the Kim et al. reference is not entitled to a priority date which predates the filing date of the present application. This is not intended to be an all-inclusive list, and there may be additional new subject matter. The new subject matter in the Kim et al. reference includes: Col. 3, lines 9 - 41 and portions of lines 59 - 67; Col. 4, lines 6 - 16; Figures 4 - 8; Col. 4, lines 61 - 67, to the extent that carbon dioxide is referenced; Col. 7,

Table I; Col. 8, lines 36 - 58; Col. 12, lines 28 - 44; Col. 14, lines 31 - 57; Col. 15, lines 15 - 67; all of Col. 16; and all of Col. 17, for example.

In the Office Action mailed January 24, 2006, the Examiner cited Kim in: Col. 6, lines 50 - 67; Col. 7, lines 36 - 64; Col. 11, lines 66 - 67, continuing at Col. 12, lines 1 - 6, and lines 28 - 35; and, Col. 13, lines 17 - 21. There is no mention of photoresist poisoning in any of this text. There is no claim to a method of avoiding photoresist poisoning in any of the claims of the Kim et al. patent.

The Kim et al. patent Claim 1 relates to a method of processing a substrate which comprises depositing two anti-reflective layers (ARCs) on the substrate by introducing a process gas which comprises a compound comprising an oxygen-free silane-based compound and an oxygen and carbon containing compound to the processing chamber and reacting the processing gas to deposit a nitrogen-free dielectric material on the substrate. There is no claim to a method of reducing photoresist poisoning. To the extent that the nitrogen-free dielectric material is less likely to poison a photoresist applied over the nitrogen-free dielectric material, a reduction of photoresist poisoning is inherent in the use of the nitrogen-free dielectric materials.

However, applicants are not claiming the use of nitrogen-free ARCs as a method of reducing photoresist poisoning. In fact, applicants teach, for example, at Paragraph [0025], Page 8, lines 18 - 26, that with respect to photoresist poisoning:

> "it is not enough to remove nitrogen-containing species from the surface of the DARC (dielectric anti-reflection coating which underlies the photoresist). It is also necessary to reduce the presence of OH groups from the surface of the DARC. The treatment of the DARC surface with a hydrogen plasma prior to photoresist application to the DARC surface . . . reduces the available OH groups on the surface of the DARC, reducing photoresist poisoning during deposition, and pattern latent image formation of the photoresist. Treatment of the DARC surface with helium prior to photoresist application also tends to reduce available OH groups on the surface of the DARC . . ."

Again, none of the Kim et al. reference claims pertain to the plasma treatment of the surface of a deposited nitrogen-free DARC layer with a hydrogen plasma or a helium plasma prior to application of photoresist to reduce photoresist poisoning.

There is a mention in the Kim et al. reference, at Col. 2, lines 24 - 39, that conventional ARC materials contain nitrogen, including silicon nitride and titanium nitride, and that nitrogen in the ARC layer may chemically alter the composition of the photoresist material, leading to what is referred to as photoresist poisoning. There is a mention in the Kim et al. reference, at Col. 3, lines 1 - 8, that pinholes may be formed through an ARC layer which expose a photoresist deposited on the ARC layer to materials underlying the ARC layer such as silicon nitride. Nitrogen from silicon nitride or other nitrogen containing material is said to diffuse through the ARC layer and chemically alter the composition of the photoresist material, resulting in photoresist poisoning.

The Kim et al. reference teaches a method of forming a nitrogen-free DARC. However, as mentioned above, applicants determined that a nitrogen-free DARC does not totally solve a photoresist poisoning problem. Thus, applicants' invention is an improvement over the invention described in the Kim et al. patent.

The Kim et al. reference describes the use of a plasma to treat a deposited nitrogen-free dielectric material for purposes of removing contaminants prior to subsequent deposition of materials on the dielectric surface in general. The plasma treatment is said to generally include using an inert gas or combinations of inert gases and mentions that helium plasma treatment is preferred over other inert gases. Use of a plasma treatment where a reducing gas including hydrogen, ammonia and combinations thereof are introduced into the chamber is also mentioned at Col. 7, lines 48 - 58. The Kim et al. reference teaches that the plasma treatment cleans contaminants off the surface of the nitrogen-free dielectric material in general, "and may be used to stabilize the layer,

such that it becomes less reactive with moisture or oxygen under atmospheric condition as well as the adhesion of layers formed (over the nitrogen-free dielectric material)". (Col. 7, lines 59 - 67 and Col. 8, lines 17 - 25).

There is no teaching in the Kim et al. patent that it is possible to reduce photoresist poisoning by treating the surface of the nitrogen-free dielectric layer, prior to application of a photoresist over the surface of the nitrogen-free dielectric layer, under processing conditions which are adequate to remove OH groups which may be on the surface. The Kim et al. patent teaches that treatment of the nitrogen-free dielectric layer surface may make the surface less reactive with moisture or oxygen, but does not even suggest that the treatment conditions must be adequate to remove OH groups which are already present on the nitrogen-free dielectric layer at the time of the plasma treatment.

In rejecting applicants' claims, the Examiner cited Col. 7, lines 36 - 38; however, this description relates to an annealing of deposited dielectric material to reduce moisture content and increase the solidity and hardness of the dielectric material. This description does not relate to plasma treatment of the surface of a deposited DARC film.

The Examiner also cited Col. 7, lines 47 - 64. As discussed above, while this disclosure relates to plasma treatment of the deposited nitrogen-free dielectric material (which may be a DARC), the teaching is that the plasma processing conditions are those which tend to: "stabilize the layer, such that it becomes less reactive with moisture or oxygen under atmospheric conditions as well as the adhesion of layers formed thereover." There is no suggestion that the plasma treatment conditions need to be sufficiently aggressive that OH groups already present on the surface of the DARC will be removed from the surface of the nitrogen-free dielectric material.

The Examiner cites Col. 6, lines 50 - 67 and Col.7, lines 51 - 58 as disclosing that the plasma is generated using an RF power source that may be provided at more than one

frequency. However, Col. 6, lines 50 - 67 pertains to process conditions used to deposit the nitrogen-free dielectric material and not to process conditions used for treatment of an already-deposited DARC film surface. Table 1 which is shown at the top of Col. 7 and Col. 8, and which pertains to the processing conditions used during deposition of a nitrogen-free dielectric material, was not present in the U.S. Patent Application, Serial No. 10/193,489, which was filed on July 11, 2002, and therefore cannot be cited against the claims in the present application.

Further, At Col 7, lines 51 - 58, there is no mention of the use of dual frequencies during a plasma treatment subsequent to deposition of the DARC film. There is only a mention that the plasma treatment may be carried out in the same process chamber as the process chamber in which the DARC film was deposited. As mentioned above, Table 1 data shown in Col. 7 was not present in the parent application which predated the filing of the present application and is not to be considered in rejecting applicants' claims.

The Examiner cites the Kim reference at Col. 7, lines 47 - 64 and in Col. 13, lines 17 - 21 as disclosing that the DARC layer may be either an inorganic, silicon-containing DARC or an organic DARC. However, Col. 7, lines 47 - 64 discusses only dielectric materials in general, without specifying the composition of the dielectric materials. Col. 13, lines 17 - 21 describes a low k etch stop or second barrier layer which may be composed of a silicon carbide or oxidized organosilane. This is not a discussion of the DARC layer composition. The Examiner has not cited a disclosure in Kim et al. which pertains to organic DARC layers or to surface treatment of such layers with a plasma to remove OH groups.

Applicants contend that the Examiner has not met the burden of establishing a case of prima facie anticipation of the invention claimed in the present application. Further, the Examiner has not met the burden of establishing a prima facie case of obviousness.

The Examiner is respectfully requested to withdraw the rejection of Claims 30 - 38 under 35 U.S.C. § 102(e) as being anticipated by the Kim et al. reference.

Applicants contend that the claims as presently amended are patentable over the cited art. The Examiner is respectfully requested to enter the amendments requested herein and to pass the application to allowance.

If the Examiner would like to discuss any of the issues with respect to patentability of the claims, applicants' attorney would very much appreciate the opportunity to discuss the issues, and can be reached at the telephone number provided below.

Respectfully submitted,

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